

# REPORT DOCUMENTATION PAGE

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5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

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5d. PROJECT NUMBER

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Air Force Research Laboratory (AFMC)  
AFRL/PRS  
5 Pollux Drive  
Edwards AFB CA 93524-7048

8. PERFORMING ORGANIZATION  
REPORT

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Air Force Research Laboratory (AFMC)  
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Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

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19a. NAME OF RESPONSIBLE  
PERSON

Leilani Richardson

19b. TELEPHONE NUMBER

(include area code)

(661) 275-5015

a. REPORT

b. ABSTRACT

c. THIS PAGE

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Unclassified

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6 separate items are enclosed

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## MEMORANDUM FOR PR (Contractor/In-House Publication)

FROM: PROI (TI) (STINFO)

26 Jun 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2000-142**  
 P. Wapner (ERC); W. Hoffman, "Microsensors that Function on the Basis of Surface and Wettability"  
 (Abstract)

**Fall Meeting of Materials Research Society**  
**(Boston, MA, 03 Dec 2000)**

**(Statement A)**  
**(Submission Deadline: 10 Jul 2000)**

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

2. This request has been reviewed by the Public Affairs Office for: a.) appropriateness for public release and/or b.) possible higher headquarters review.

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

3. This request has been reviewed by the STINFO for: a.) changes if approved as amended, b.) appropriateness of distribution statement, c.) military/national critical technology, d.) economic sensitivity, e.) parallel review completed if required, and f.) format and completion of meeting clearance form if required

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

4. This request has been reviewed by PR for: a.) technical accuracy, b.) appropriateness for audience, c.) appropriateness of distribution statement, d.) technical sensitivity and economic sensitivity, e.) military/national critical technology, and f.) data rights and patentability

Comments: \_\_\_\_\_  
 \_\_\_\_\_

APPROVED/APPROVED AS AMENDED/DISAPPROVED

\_\_\_\_\_  
 PHILIP A. KESSEL Date  
 Technical Advisor  
 Propulsion Science and Advanced Concepts Division

20021119 091

## MICROSENSORS THAT FUNCTION ON THE BASIS OF SURFACE TENSION AND WETTABILITY

The displacement of non-wetting fluid droplets contained within capillaries that have axial profiles <sup>and</sup> that are non-uniform can be used to accurately and reproducibly measure the forces ~~reproducibly~~ <sup>need different word - this doesn't make sense</sup> acting upon these droplets. The position of droplets within such micro-sensors is dictated by surface tension, wettability, geometric configuration of the confining walls, and the forces acting upon the droplet. These micro-sensors can measure pressure and acceleration, and can also be made to operate as micro-valves, micro-switches, optical shutters, as well as other devices. They have no moving mechanical parts to wear out, and can theoretically endure high amounts of over-actuation and still return to initial levels of accuracy and precision without harm. The axial profiles of these shaped capillaries are easily fabricated using microtube technology developed at the Air Force Research Laboratory at Edwards Air Force Base. However, it is also possible to use non-circular shaped voids and still achieve similar capabilities with some limitations. These non-circular shaped voids can be manufactured using more conventional MEMS technologies such as photolithography and LIGA.